

Amendments to the Drawings:

The attached sheet of drawing includes changes to Figure 12. This sheet replaces the original sheet including Figure 12.

Attachment: Replacement Sheet

REMARKS

In the Office Action, claims 10-19 are rejected as allegedly unpatentable for alleged non-statutory obviousness-type double patenting over claims 1-5 of U.S. Patent No. 6,764,767; and claims 15-24 are also rejected for alleged non-statutory obviousness-type double patenting over claims 1-5 of U.S. Patent No. 6,764,767. In response, Applicants have submitted a Terminal Disclaimer, and thus, these rejections should be withdrawn.

In the Office Action, the Patent Office objects to the disclosure and indicates that pages 68 and 69 of the specification are allegedly missing. In response, Applicants respectfully submit that these pages were submitted along with Applicants' petition requesting reconsideration filed on December 13, 2004. This petition was granted in the USPTO Decision on Petition mailed on December 23, 2004. Therefore, Applicants believe that this objection should be withdrawn. For convenience, Applicants are again submitting a copy of pages 68 and 69 for review.

Further, the Patent Office appears to object to Figure 12 where it indicates that numeral 6 is missing. In response, Applicants are submitting herewith Figure 12 with changes as specified by the Examiner. Therefore, Applicants respectfully request that Figure 12 be entered for purposes of examination.

In the Office Action, claims 10-24 are rejected pursuant to 35 U.S.C. § 102 as anticipated by or, in the alternative, pursuant to 35 U.S.C. § 103 as obvious over European Patent Document No. EP 0 762 522 ("Tamaki"). Applicants believe that this rejection should be withdrawn as discussed below in further detail.

For example, the Patent Office relies on Tamaki for its alleged disclosure with respect to a carbon material used as an anode in a lithium secondary battery, which material has a boron content of 0.1 to 2 weight percent as disclosed in Tamaki on page 3 at line 29. However, Tamaki further indicates that "the carbon material obtained by the proposed sintering method is not satisfactory in respect of the increase of charge and discharge capacities of the secondary battery including a negative electrode composed of the above carbon material, even if the residual boron content is increased." See, Tamaki, page 3, lines 29-31. Clearly, this suggests that the carbon material with specified boron content ranging from 0.1 to 2.0 percent does not result in beneficial effects, particularly as applied to a secondary battery.

In contrast, the claimed invention recites, in part, a graphite powder that includes a carbon material containing about .01 to less than 1.0 weight percent of boron (claim 10), where a negative electrode material consists essentially of the graphite powder (claim 15), and where a lithium ion secondary battery includes said negative electrode material (claim 20).

Applicants have uniquely discovered that the graphite powders of the claimed invention exhibit high crystallinity and high density of the interstitial planer section of the loop closure structure without having to utilize special, expensive materials to manufacture same. By employing such graphite powders as a negative electrode material of a lithium ion secondary battery, Applicants have demonstrated that desirable discharged capacity and charging/discharging efficiency can be achieved during use, even with graphite powders that include less than 1 weight percent of boron. See, Applicants' specification, for example, Table 4, page 61. Based on at least these reasons, Applicants believe that one skilled in the art would consider Tamaki as distinguishable from the claimed invention and as effectively teaching away from same. Therefore, Applicants respectfully request that the anticipation and obviousness rejections in view of Tamaki be withdrawn.

Accordingly, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing.

Respectfully submitted,

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of 0.5 mol of lithium carbonate and 1 mol of cobalt carbonate in air at 900°C for five hours. The results of X-ray diffractometry indicated good coincidence of the produced LiCoO_2 with the peak of LiCoO_2 registered in the JCPDS file. This LiCoO_2 was pulverized and classified to LiCoO_2 powders having a 50% cumulative particle size of 15 μm . 95 parts by weight of the LiCoO_2 powders and 5 parts by weight of lithium carbonate powders were mixed together to form a powder mixture. 95 parts by weight of the resulting powder mixture, 6 parts by weight of the electrically conductive graphite and 3 parts by weight of PVDF as a binder were mixed to prepare a positive electrode material. This positive electrode material was dispersed in N-methyl pyrrolidone to form a paste-like slurry which was uniformly coated on both sides of a strip-like aluminum foil, 20 μm in thickness, which later serves as a positive electrode current collector 10. The resulting assembly was dried and compression-molded to form a strip-like positive electrode 2.

The strip-like negative electrode 1, strip-like positive electrode 2 and separators 3, formed by micro-porous polypropylene films 25 μm in thickness, were layered in the order of the strip-like negative electrode 1, separator 3, strip-like positive electrode 2 and the separator 3, and the resulting layered product was wound about itself a number of times to form a spirally-shaped electrode member having an outside diameter of 18 mm. This spirally-shaped electrode member was housed in a nickel-plated iron battery can 5. An insulating plate 4 was arranged on the top and the bottom of the spirally-shaped electrode member. An aluminum positive terminal lead 12 was

led out from the positive electrode current collector 10 and welded to a battery cap 7, whilst a nickel negative terminal lead 12 was led from the negative terminal current collector 9 and welded to the battery can 5.

Into the battery can 5, housing this spirally shaped electrode member, a 1M solution of LiPF_6 dissolved in a mixed solvent of ethylene carbonate and diethylene carbonate bearing a 1:1 volume ratio of ethylene carbonate to diethylene carbonate was charged as an electrolyte. A safety valve device 8 having a current breaking mechanism and a battery lid 7 were caulked to the battery can 5, via a insulated sealing gasket 6 having an asphalt surface coating, to prepare a secondary battery having a non-aqueous electrolytic solution, with a diameter and a height of 18 mm and 65 mm, respectively.

50 batteries were tentatively manufactured, for respective groups of graphite powders, and the following evaluation was made of the performance of these batteries. The results of the evaluation are shown in Table 6 along with the performance of the negative electrodes of the graphite powders used for the negative electrodes (discharging capacity and charging/discharging efficiency of the negative electrodes).

Method for Evaluation of Batteries

- 1) Charging Conditions: The batteries were charged for 2.5 hours under the maximum charging voltage of 4.2 V and the current intensity of 1A.
- 2) Discharging Conditions: The batteries were discharged up to 2.75 V with the constant current of 700 mA.